University of Gdańsk

Subject card

Subject name and code	Physical Oceanography - laboratory , PG_00206133		
Field of study	Oceanography		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	3.0
Learning profile	academic	Assessment form	credit
Conducting unit	Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Marek Kowalewski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	45.0	0.0	0.0	45

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	3.0	27.0	75

Subject objectives

To know and understand:

- spatial and temporal variation of temperature, salinity and density of seawater and the processes that shape this variation
- basic dynamic processes in the sea (forces acting on water masses in the sea, geostrophic currents, Ekman theory, mixing, wind waves)
- fundamentals of marine acoustics (sound propagation and refraction in the sea; sound channel)

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OCEANL3-W01] has an advanced knowledge and understanding of the terminology used in oceanography and related exact and natural sciences (in Polish and a selected foreign language)	To an advanced degree, student knows and understands the basic terminology used in physical oceanography; knows and understands the basic research issues/problems in physical oceanography physical oceanography and the complexity of physical processes in the sea.	[SW3] text preparation/written work
[OCEANL3-W03] has an advanced understanding of the relationships between living and non-living components of aquatic environments, and is aware of the complex nature, intricacy, and natural variability of these environments	Student knows and understands the basic issues/problems of research in physical oceanography: the relationships between the elements of the aquatic environment, is aware of the complex nature of aquatic environments, their complexity and natural variability	[SW5] implementation of a problem task
[OCEANL3-U03] is able to process, describe, and present results, and draw conclusions	Student is able to develop, describe and report on the results of the analyses carried out during the exercises and formulate conclusions based on the results of these analyses.	[SU3] text preparation/written work
[OCEANL3-K03] is ready to exercise caution and criticism in accepting information from scientific literature, the Internet and other media relating to natural sciences	Student is willing to exercise caution and criticism in accepting information from scientific literature, the Internet and other media relating to physical oceanography	[SK3] text preparation/written work
[OCEANL3-U01] is able to use the current scientific terminology in the field of oceanography in various forms of expression	Student is able to use current scientific terminology in presenting and discussing problems in physical oceanography	[SU4] test/exam - oral or written
[OCEANL3-K04] is willing to constantly deepen knowledge in the field of oceanography and improve professional qualifications, supported by the knowledge of experts	Student is ready to continuously improve his/her knowledge of physical oceanography	[SK5] implementation of a problem task

Subject contents

1. Visualization of oceanographic data (Ocean data VIew program).
2. Spatial and temporal variability of salinity, temperature and density of seawater. Thermocline and halocline.
3. T-S diagrams. Water masses.
4. Vertical stability of water masses, Väisäla-Brunta parameter.
5. Mixing, differential diffusion of heat and salt, salt fingers. Turner's angle.
6. Sound propagation in the sea. Sound channel. Wind currents, Ekman theory, upwelling and downwelling.
7. Geostrophic currents. Dynamic method.
8. Wind waves.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	51.0%	50.0%
Reports from exercises	51.0%	50.0%

Recommended reading

Basic literature	1. Talley i in., 1996, Descriptive Physical Oceanography. An Introduction, Elsevier, https://booksite.elsevier.com/DPO/. 2. Stewart, R.H., 2008, Introduction to physical oceanography; https://open.umn.edu/opentextbooks/textbooks/20. 3. Duxbury, A.B. Duxbury A.C., Sverdrup, K.A., 2002, Oceany świata, PWN, 636s.
Supplementary literature	1. Lisicki A., 1996, Pływy na morza i oceanach, GTN, 129s. 2. Mellor G., 1996, Introduction to physical oceanography, Am. Inst. Phys., 258s. 3. Massel S., 2010, Procesy hydrodynamiczne w ekosystemach morskich, Wyd. Univ. Gda., 495s.
eResources addresses	

Example issues/ example questions/ tasks being completed

Work placement

Not applicable

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